The K2 RR Lyrae survey

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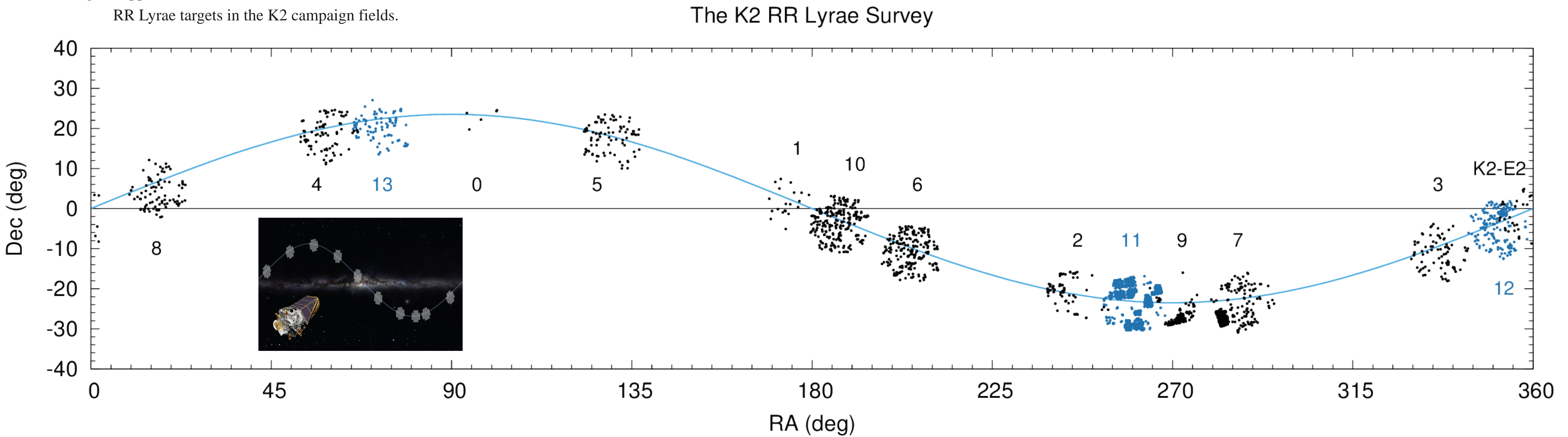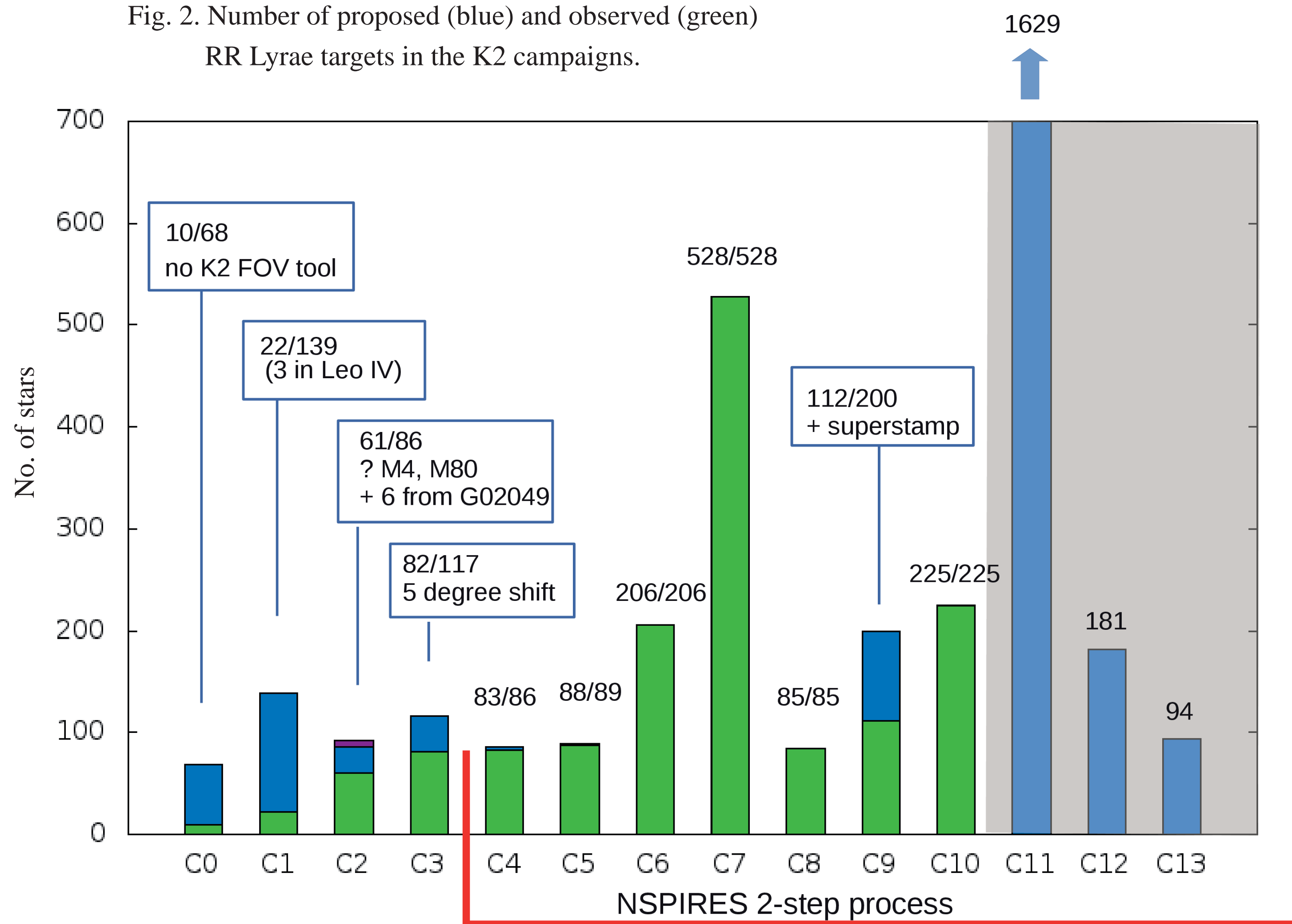Fig. 1. Approved (blue) and observed (black) RR Lyrae targets in the K2 campaign fields.

Fig. 2. Number of proposed (blue) and observed (green) RR Lyrae targets in the K2 campaigns.

WHAT

The K2 RR Lyrae survey is conducted by the Kepler Asteroseismic Science Consortium RR Lyrae and Cepheid Working Group. We have been proposing as many as possible RR Lyrae stars along the ecliptic during the K2 Mission (Howell et al. 2014, Fig 1.) So far the project is a huge success, Fig. 2. shows the number of approved/observed RR Lyrae targets (Plachy et al. 2016).

WHERE

The sample covers RR Lyrae in extragalaxies (Sagittarius dwarf galaxy, Leo IV (Molnár et al. 2015)), globular clusters (M80, M4), the Galactic Bulge (Campaign 9), and several Galactic fields along the ecliptic both in high and low galactic latitudes, the Galactic center and anticenter directions, halo and field stars, as well as prominent halo structures, such as the Sagittarius stream.

WHY

The project will allow us to study the occurrence rate and statistics of newly found dynamical phenomena, like period doubling, resonances, chaos, modulations, nonradial modes and their correlation with age, metallicity, and galactic position. The extremely precise, "textbook" light curves will provide a golden sample to calibrate and test the algorithms and performance of and exploit synergies with upcoming large sky surveys, like Gaia and the Large Synoptic Survey Telescope (LSST).
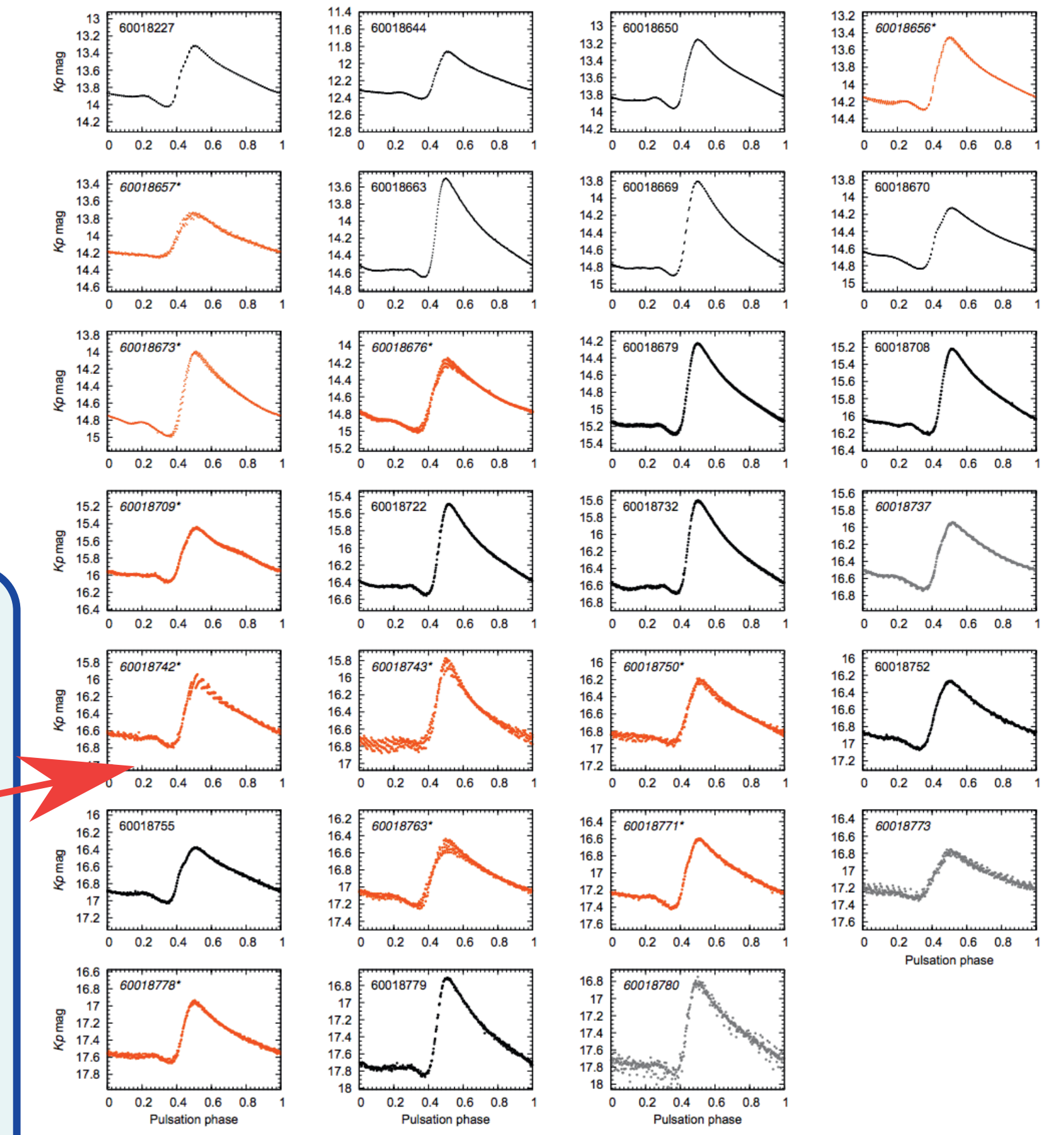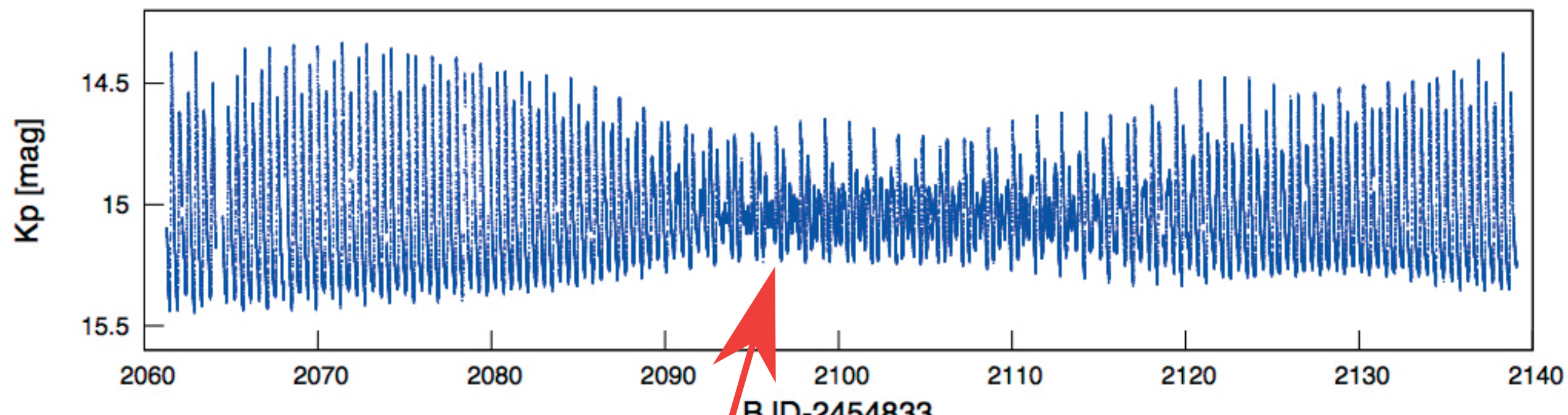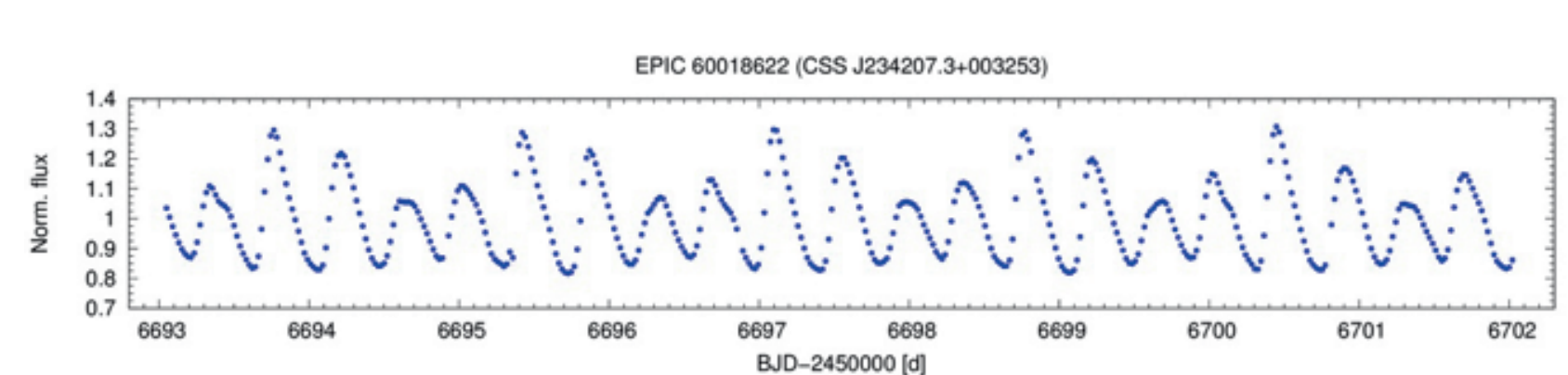
Preliminary results

1. Discovery of a peculiar RRd star, where both modes are modulated in antiphase. This is the first example that can be studied with accurate space-borne photometry (see poster PB.S10.61 by Plachy et al.).

2. Family portrait of 33 RR Lyrae stars (Molnár et al. 2015b) in the K2 Two-Wheel Concept Engineering Test (K2-E2).

3. A sizeable sample of RRd (double-mode) stars, that were not present in the original Kepler field, and so far were seen only with MOST (Gruberbauer et al. 2007) and CoRoT (Chadid et al. 2012).

4. Unambiguous detection of Blazhko modulation in an extragalaxy (Leo IV) beyond the Magellanic Clouds (Molnár et al. 2015a).

5. Discovery of a strongly modulated RRc star (Molnár et al. 2015b).

6. Populating the Petersen-diagram with exotic and new types of periodicities (see poster PB.S10.57 by Molnár et al.)

+ Stay tuned for many more exciting discoveries !
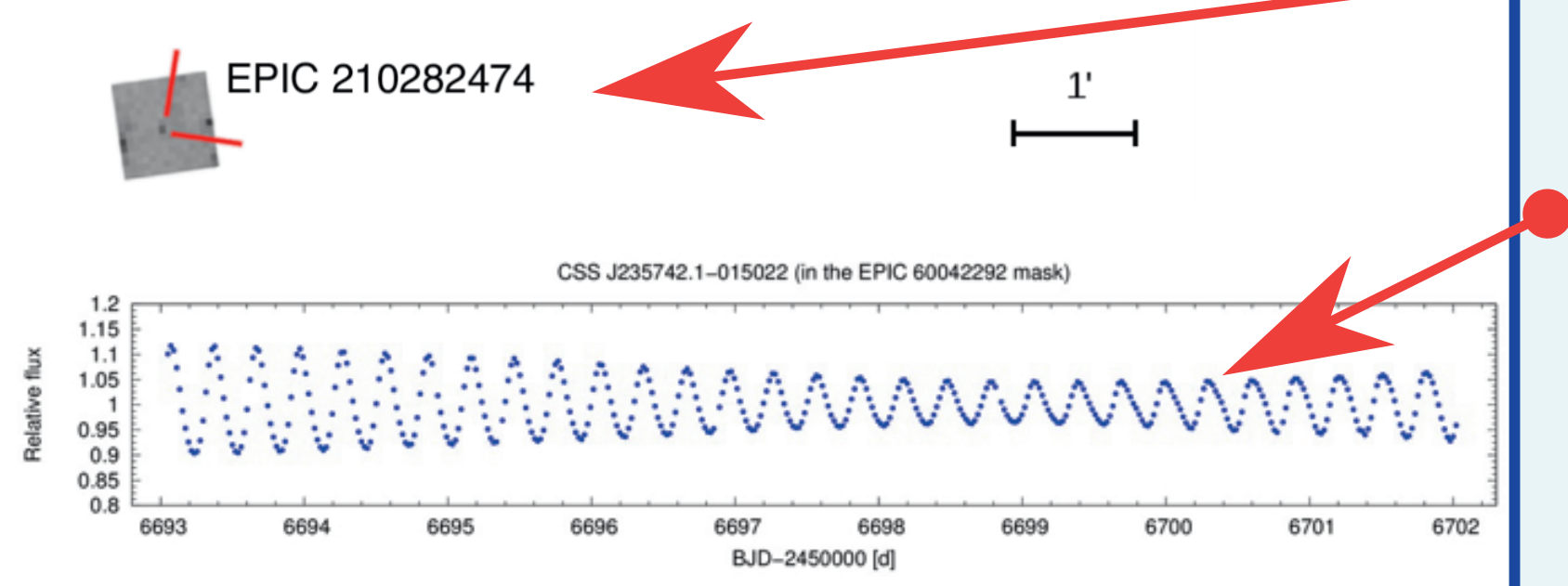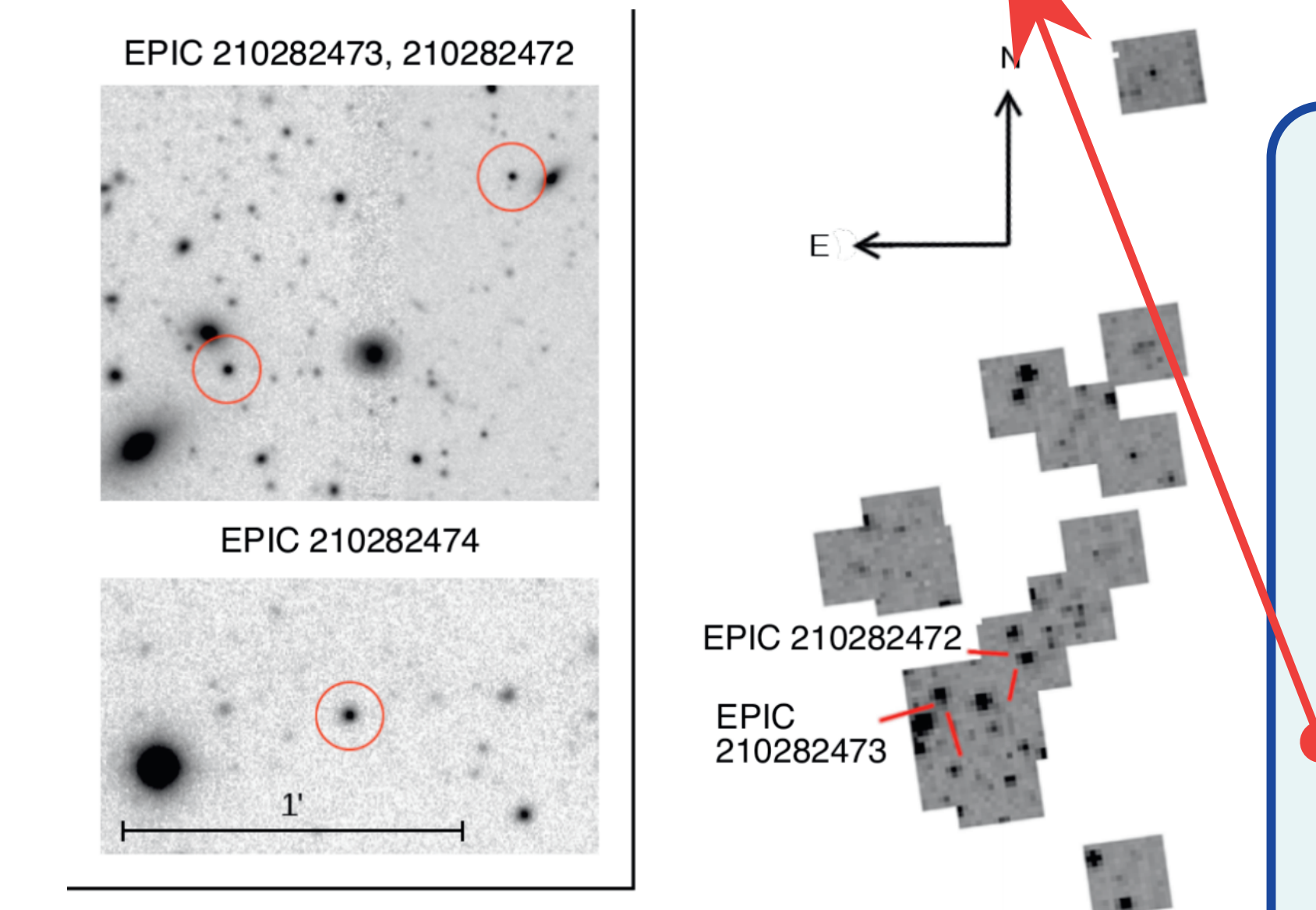
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